

Section 4.2.

Names and Formulas of Compounds.

Textbook pages 148 to 201.

Before You Read.

In this section, you will learn how to write the names and formulas of ionic and covalent compounds. What do you already know about these compounds?

How do you represent an ionic compound?

Ionic compounds are composed of positive and negative ions. They can be represented with both a name and a chemical formula.

1. Name: In an **ionic compound**, the first part of the name indicates the positive ion (a metal) and the second part indicates the negative ion (a non-metal). The non-metal's name always ends with the suffix "-ide." For example, lead sulphide.
2. Chemical formula: Follow the steps below to write the chemical formula for an ionic compound.
 - Identify the chemical symbol for each ion and its charge.
 - Determine the total charges needed to balance the positive and negative charges of each ion.
 - Note the ratio of positive to negative ions.
 - Use these subscripts to write the chemical formula. Make sure the subscripts represent the smallest whole number formula. A "one" is not shown as a subscript.

There are also two special cases you must consider when naming and writing the chemical formulas of ionic compounds. These are compounds containing multivalent metals and polyatomic ions.

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1. Multivalent metals: Multivalent metals can form two or more positive ions with different ionic charges. To distinguish between two ions formed from multivalent metals, the name must contain the ion's charge. The Roman numerals I, II, III, IV, V, VI, and VII, corresponding to ion charges one positive to seven positive, are used for this purpose. The Roman numerals are included in the name of the compound. For example, nickel (II) chloride has the formula NiCl_2 . Thus, nickel (II) has an ion charge of two positive. Nickel (III) has the formula NiCl_3 . The ion charge of nickel (III) is three positive.

2. Polyatomic ions: A **polyatomic ion** is an ion composed of more than one type of atom joined by covalent bonds. For example, carbonate is a polyatomic atom. All polyatomic atoms have special names assigned to them. You will need to look these up in table 4.11 (textbook page 192) when naming a compound that includes a polyatomic ion.

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How do you represent a binary covalent compound?

A **binary covalent compound** contains two non-metal elements joined together by one or more covalent bonds. Like ionic compounds, binary covalent compounds can be represented with both a name and a chemical formula.

1. Name. : When naming a binary covalent compound, prefixes are used to indicate how many atoms of each element are present. The second element's name ends with the suffix "-ide." For example, dinitrogen trioxide has two atoms of nitrogen and three atoms of oxygen. No prefix is used if there is just one atom of the first element. For example, carbon dioxide. The first ten prefixes used to name binary covalent compounds are "mono-", "di-", "tri-", "tetra-", "penta-", "hexa-", "hepta-", "octa-", "nona-", and "deca-".
2. Chemical formula. : When writing the chemical formula, subscripts are used to indicate the number of atoms present. For example, dinitrogen trioxide has the chemical formula N₂O₃. The exact number of atoms is always shown in the formula. For example, hydrogen peroxide is written as H₂O₂, not H₂O. Unlike the formula for an ionic compound, the subscripts do not always represent the smallest whole number formula.

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